

Message Text

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SUBJECT: A TIDE IN THE AFFAIRS OF MEN: FUNDY POWER

SUMMARY: THE UPPER REACHES OF THE BAY OF FUNDY, WITH THEIR ENORMOUS TIDAL RANGES, HAVE LONG BEEN VIEWED AS POSSIBLE SITES FOR HYDROELECTRIC DEVELOPMENTS. ALTHOUGH POWER FROM THE TIDES WORKED MILLS AS LONG AGO AS THE 12TH CENTURY, IT WAS ONLY RECENTLY, WITH THE DEVELOPMENT OF THE BULB TURBINE AND THE QUADRUPLING OF OIL PRICES, THAT FUNDY TIDAL POWER LOOKED LIKE BECOMING AN ECONOMIC PROPOSITION. THE FIRST PHASE OF A TWO-PHASE STUDY OF THE ECONOMICS AND TECHNOLOGICAL FEASIBILITY OF A FUNDY TIDAL POWER PROJECT IS EXPECTED TO BE MADE PUBLIC IN LATE FEB OR EARLY MAR 1978 AND IS EXPECTED TO BE FAVORABLE WITH RESPECT TO ECONOMIC FEASIBILITY. BUT EVEN IF PHASE TWO OF THE STUDY IS ALSO FAVORABLE, THE PREDILECTION OF OTTAWA AND NEW BRUNSWICK FOR NUCLEAR POWER MAY DELAY FURTHER ANY START-UP DATE FOR A TIDAL POWER PROJECT. IF NO DELAYS WHATSOEVER WERE ENCOUNTERED, THE EARLIEST DATE FOR TIDAL POWER PRODUCTION WOULD BE 1990.

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THE FUNDY TIDAL POWER PROJECT IS COMPETING FOR FEDERAL FUNDS WITH NEWFOUNDLAND'S GULL ISLAND HYDROELECTRIC PROJECT. IT IS DIFFICULT TO SEE HOW MONEY COULD BE FOUND FOR BOTH. END SUMMARY.

1. WHEN THE INCOMING TIDE SWEEPS EASTWARD INTO THE GULF OF MAINE, THE CURVATURES OF THE COASTS OF NEW

ENGLAND AND OF NOVA SCOTIA ACT TOGETHER LIKE A GIANT FUNNEL: TRAPPING, DEEPENING, AND COMPRESSING THE SHOREWARD-BOUND TIDE AND AT THE SAME TIME SHIFTING ITS DIRECTION OF FLOW NORTHEASTWARD INTO THE BAY OF FUNDY. AS IT SURGES INTO THE MOUTH OF THE BAY OF FUNDY, THE TIDE RAISES THE WATER LEVEL 18 FEET AT PASSAMAQUODDY BAY WHERE MAINE AND NEW BRUNSWICK MEET. FARTHER ON AS FUNDY'S SHORELINES COME PROGRESSIVELY CLOSER TO EACH OTHER THE FUNNEL EFFECT INTENSIFIES AND, SINCE THE INCOMING WATER CANNOT SPREAD OUT LATERALLY, IT RISES: TO 20 FEET, 24, 28...

2. NEAR THE HEAD OF THE BAY, A PENINSULA JUTS SOUTH-WESTWARD, CLEAVING IT INTO TWO ARMS. THE TIDAL FLOW, NOW DEEPER AND MIGHTIER THAN EVER, IS SPLIT IN TWO BY THIS PENINSULA. PART OF IT RUSHES INTO THE MORE SOUTHERLY ARM, MINAS BASIN AND COBEQUID BAY. THE OTHER PART GOES INTO THE NORTHERLY ARM, CHIGNECTO BAY, SHEPODY BAY, AND CUMBERLAND BASIN.

3. IT IS IN THESE UPPER REACHES OF THE BAY OF FUNDY--THE END OF THE LINE, SO TO SPEAK--WHERE THE COASTLINES NARROW MOST RAPIDLY, WHERE THE FUNNEL EFFECT IS MOST MARKED, AND, CONSEQUENTLY, WHERE THE TIDAL RANGES ARE THE GREATEST. THE HEIGHTS OF THE TIDES IN THESE REACHES OF THE BAY AVERAGE FROM 29 TO 36 FEET. AT UNCLASSIFIED

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THEIR MAXIMUM, THEY RANGE FROM 47 TO 53 FEET. SMALL WONDER, THEN, THAT THESE TIDES, WHICH UNFAILINGLY REPEAT THEMSELVES APPROXIMATELY EVERY 12 HOURS AND 25 MINUTES, HAVE LONG BEEN THOUGHT OF AS POTENTIAL SOURCES OF HYDROELECTRIC POWER.

4. ON A MODEST SCALE, THE CONCEPT OF TIDAL POWER IS NOT NEW. THERE WERE TIDAL MILLS IN BRITAIN, FRANCE, AND SPAIN AT LEAST AS EARLY AS THE 12TH CENTURY. LATER, DURING OUR COLONIAL PERIOD, SUCH MILLS WERE ALSO BUILT IN WHAT IS NOW THE UNITED STATES AND CANADA. IT WAS NOT UNTIL THE 1920'S, HOWEVER, THAT THE PRACTICALITY OF LARGE TIDAL HYDROELECTRIC PROJECTS BEGAN TO BE DEBATED. IN THE MID-1930'S ONE SUCH PROJECT WAS ACTUALLY STARTED AT PASSAMAQUODDY BAY BY THE U.S. ARMY CORPS OF ENGINEERS BUT WAS ABANDONED WHEN

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CONGRESSIONAL APPROVAL COULD NOT BE OBTAINED FOR CONTINUED FUNDING. NOT UNTIL 1966 WAS A MAJOR TIDAL HYDROELECTRIC PROJECT (240 MW) COMPLETED, AT LA RANCE, NEAR ST. MALO, FRANCE. A SMALL, EXPERIMENTAL TIDAL POWER GENERATING STATION (LESS THAN 1 MW) WAS SUBSEQUENTLY, IN 1968, COMPLETED IN THE USSR.

5. ALTHOUGH TALK AND SPECULATION ABOUT HARNESSING FUNDY TIDES HAS GONE ON THROUGHOUT THIS CENTURY, IT WAS NOT UNTIL 1944 THAT SERIOUS ANALYSIS BEGAN WITH A CANADA-NEW BRUNSWICK EXAMINATION OF A TWO-BASIN CONCEPT FOR THE PETITCODIAC AND MEMRANCOOK RIVERS, LINKED BY A CANAL WITH A POWERHOUSE. THIS SCHEME WAS FOUND TO BE UNECONOMIC. SOME FURTHER CURSORY STUDIES OF VARIOUS SITES AT THE HEAD OF THE BAY OF FUNDY WERE MADE IN THE 1950'S AND '60'S AND A MAJOR THREE-YEAR STUDY FINANCED BY THE GOVTS OF CANADA, NEW BRUNSWICK, AND NOVA SCOTIA WAS UNDERTAKEN DURING THE PERIOD 1966-9. ALL OF THESE INVESTIGATIONS CONCLUDED THAT LARGE-SCALE FUNDY TIDAL POWER PROJECTS WOULD BE UNECONOMIC.

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6. THE DEVELOPMENT OF THE BULB UNIT DURING THE 1950'S AND '60'S WAS NOT THE COMPLETE SOLUTION TO THE DOUBTFUL ECONOMICS OF TIDAL POWER, BUT WAS NONETHELESS A MAJOR STEP FORWARD. THE BULB UNIT OR BULB TURBINE IS A PROPELLER-TYPE MACHINE WITH A HORIZONTAL SHAFT WHICH

IS ESPECIALLY DESIGNED TO GENERATE ELECTRICITY AT TIDAL POWER SITES OR ON RIVER INSTALLATIONS WHERE THERE ARE RELATIVELY LOW OPERATING HEADS. ANOTHER SUCH DEVICE WHICH SHOWS GREAT PROMISE IS THE SO-CALLED STRAFLO UNIT, A MODERN REWORKING OF A STRAIGHT-FLOW TURBINE-GENERATOR CONCEPT OF THE 1920'S.

7. IF IMPROVED HARDWARE WAS NOT OF ITSELF SUFFICIENT TO ASSURE TIDAL POWER'S ECONOMIC FEASIBILITY, THE GUADRUPLING OF OIL PRICES AFTER 1973 VERY LIKELY WAS. IN DECEMBER 1975 THE GOVTS OF CANADA, NEW BRUNSWICK, AND NOVA SCOTIA COMMISSIONED A NEW TWO-PHASE STUDY WHICH WOULD BE A COMPLETE REAPPRAISAL OF THE PRACTICALITIES OF DEVELOPING TIDAL POWER IN THE BAY OF FUNDY. PHASE ONE OF THE STUDY IS NARLY COMPLETE AND IS EXPECTED TO BE RELEASED SOMETIME AROUND THE END OF FEBRUARY OR BEGINNING OF MARCH, 1978. THE OBJECTIVE OF PHASE ONE IS TO ANSWER THE QUESTION, "IS TIDAL POWER COMPETITIVE?" TO MEET THIS OBJECTIVE, SEPARATE STUDIES OF FIVE MAJOR TASK AREAS HAVE BEEN UNDERTAKEN:

- A) TIDAL POWER PLANT DESIGN;
- B) TIDAL POWER GENERATION;
- C) SYSTEM STUDIES, MARKETS, ALTERNATIVE GENERATION SUPPLIES, AND TRANSMISSION;
- D) SOCIO-ECONOMIC ASPECTS; AND
- E) ENVIRONMENTAL ASPECTS.

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8. IN LATE SEPT, 1977, THE MANAGER OF THE NOVA SCOTIA POWER CORPORATION'S PROJECT DIVISION MADE A SPEECH TO A PROFESSIONAL GROUP AND STATED IN ESSENCE THAT THE PHASE ONE STUDY APPEARED TO SHOW THAT FUNDY TIDAL POWER WAS NOW ECONOMIC AND, WITH GOVERNMENT INVOLVEMENT, WOULD BE FINANCIALLY FEASIBLE. HE PREDICTED, THEREFORE, THAT THE BAY OF FUNDY TIDAL POWER REVIEW BOARD WILL RECOMMEND THAT WORK GO FORWARD ON PHASE TWO OF THE STUDY WHICH WOULD CONSIST OF:

- A) BUILDING A PHYSICAL MODEL OF THE BAY TO STUDY CURRENTS, SEDIMENTATION, SCOURING, ETC.
- B) EXTENSIVE DRILLING PROGRAM TO ENHANCE KNOWLEDGE OF THE FOUNDATIONS.
- C) DETAILED DESIGN OF THE STRUCTURES.
- D) SEARCH FOR THE MATERIALS NEEDED FOR CONSTRUCTION.
- E) PLANNING OF THE PROJECT TO BEST FIT THE SOCIO-ECONOMIC AND ENVIRONMENTAL CONDITIONS OF THE AREA.

9. PHASE TWO WILL BE THE FIRST PROJECT OF THE NEW

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MARITIME ENERGY CORPORATION AND IS ESTIMATED TO COST
DOLS 30 MILLION (HALIFAX 0039). BUT WHEN ACTUAL
CONSTRUCTION IS UNDERTAKEN AT ONE OF THE THREE PRIME
SITES UNDER CONSIDERATION, SOME REALLY BIG MONEY WILL
HAVE TO BE FOUND. AT WHAT MAY BE THE LIKELIEST SITE,
COBEQUID BAY, IT IS ESTIMATED THAT, AT 1976 PRICES, IT
WOULD COST APPROX DOLS 3.7 BILLION FOR A 100-TURBINE,
60-SLUICE INSTALLATION WITH A 3800 MW CAPACITY. THE
LEAST EXPENSIVE INSTALLATION COULD BE BUILT IN
CUMBERLAND BASIN WITH 35 TURBINES AND 24 SLUICES AND
AN INSTALLED CAPACITY OF 1085 MW FOR AN ESTIMATED DOLS
1.2 BILLION.

10. SO WHEN IS THE DREAM OF FUNDY TIDAL POWER LIKELY
TO BECOME A REALITY? WHEN HE IS IN AN OPTIMISTIC MOOD,
NOVA SCOTIA PREMIER GERALD REGAN SAYS 1990. BUT THEN
HIS OPTIMISM GIVES WAY TO FEARS THAT OTTAWA AND NEW
BRUNSWICK WILL GANG UP ON NOVA SCOTIA AND PUT FUNDY
POWER ON THE BACK BURNER WHILE THEY CONCENTRATE ON
NUCLEAR POWER. IF THAT DOES INDEED HAPPEN, FUNDY
TIDAL POWER MAY CONTINUE TO BE A LONG, LONG WAY DOWN
THE ROAD.

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11. COMMENT: IF THE CANADIAN FEDERAL GOVERNMENT IS PLANNING SUBSTANTIAL OUTLAYS FOR HYDROELECTRIC POWER FACILITIES IN THE BAY OF FUNDY, ONE WONDERS HOW IT CAN AVOID GETTING COMMITTED TO EQUALLY-SUBSTANTIAL OUTLAYS FOR THE HYDRO POWER PROJECT AT GULL ISLAND IN LABRADOR. BECAUSE IT IS SITED ON THE CHURCHILL RIVER, THE GULL ISLAND PROJECT DOES NOT SUFFER THE TWO MAIN DIS-ADVANTAGES OF TIDAL POWER PROJECTS: A LOW OPERATING HEAD (THE DIFFERENCE BETWEEN HIGH AND LOW TIDE) WHICH FLUCTUATES WIDELY DURING ITS TWICE-DAILY CYCLE AND THE FACT THAT ITS PEAK GENERATING CAPACITY MOVES IN AND OUT OF PHASE WITH THE NORMAL DEMAND FOR ELECTRICAL ENERGY. THIS LATTER DISADVANTAGE OF TIDAL POWER, OF COURSE, CAN BE OVERCOME TO A GREAT EXTENT BY RETIMING THE TIDAL OUTFLOW THRU PUMPED STORAGE OR THRU BASIN EFFECTS, OR BY PAIRING THE TIDAL PROJECT WITH A RIVERINE HYDROELECTRIC PROJECT WHICH WOULD CURTAIL ITS OWN GENERATION OF POWER AT THOSE TIMES WHEN POWER WAS AVAILABLE FROM THE TIDAL PROJECT. BUT ALL OF THESE SCHEMES TO OVERCOME THE CYCLICAL NATURE OF TIDAL POWER EITHER ADD TO THE COST OF THE TIDAL PROJECT, LESSEN ITS GENERATING CAPACITY AND OUTPUT, OR DO ALL OF THESE THINGS. AND SINCE BOTH THE FUNDY AND THE GULL ISLAND PROJECTS ARE LIKELY TO REQUIRE SEVERAL BILLIONS OF DOLLARS TO CONSTRUCT, ONE WONDERS WHETHER (OR WHEN) FEDERAL FUNDS WILL BE AVAILABLE TO BUILD BOTH OF THEM.

12. WHY, THEN, SHOULD THE FEDERAL GOVERNMENT GIVE ANY SERIOUS CONSIDERATION TO FUNDY TIDAL POWER? ASSUMING IT HAS ANY REAL INTEREST IN HYDROELECTRIC POWER, WHY SHOULD IT NOT FOCUS ITS ATTENTION AND ITS DEVELOPMENT

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EFFORTS ON GULL ISLAND? FORGETTING FOR THE MOMENT THE POLITICAL BROUHAHA THAT WOULD BE STIRRED UP IF OTTAWA WERE THUS TO FAVOR NEWFOUNDLAND OVER THE MARITIMES, THERE REMAINS THE PROBLEM OF BRINGING GULL ISLAND POWER TO MARKETS. UNTIL AND UNLESS QUEBEC WILL PERMIT LABRADOR POWER TO BE SOLD BY NEWFOUNDLAND HYDRO TO MARKETS BEYOND QUEBEC, OR UNTIL IT BECOMES ECONOMICALLY FEASIBLE FOR POWER TO BE TRANSMITTED TO THE MAINLAND BY CABLE UNDER THE CABOT STRAIT BETWEEN NEWFOUNDLAND AND NOVA SCOTIA, THE GULL ISLAND POWER PROJECT IS LIKELY TO EXIST ONLY ON THE DRAWING BOARD.

13. UNDER THE CIRCUMSTANCES, IT WOULD BE ALMOST UNDER-

STANDABLE IF MR GILLESPIE WERE TO PLAY FOR TIME AND CALL
FOR STUDY AFTER STUDY IN HOPES THAT, SAY, A BIG EAST COAST
OIL OR GAS STRIKE WOULD PUT SOME MONEY IN THE GOVERNMENTAL
JEANS AND MAKE THE FINANCING OF BOTH THE FUNDY TIDAL AND
THE GULL ISLAND POWER PROJECTS POSSIBLE. CHARLES DARWIN'S
OFT-QUOTED STATEMENT THAT "WATER POWER IS THE ONLY REALLY
BIG PRESENT SOURCE OF ENERGY THAT CAN BE COUNTED AS
INCOME AND NOT CAPITAL" MAY BE TRUE AS FAR AS IT GOES
BUT GILLESPIE MUST BE PAINFULLY AWARE THAT IT TAKES A
HEAP OF CAPITAL BEFORE ANY OF THAT INCOME STARTS COMING
IN. END COMMENT.

14. DRAFTER: JHMOORE.

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